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(Research concerning measures for combatting fish diseases)

Research Concerning Sleeping Sickness (Provisional Appellation) in Cultured Yamame and Amago-I

(Investigation of conditions of occurrence and etiology)

In yamame and amago reared at two salmon farms in Hiroshima Prefecture there occurred a disease not previously known, the principal symptoms of which are abnormal swimming and lying sideways, and during this year approximately 100,000 fish contracted the disease and died. The conditions of its occurrence and its etiology were examined.

Experimental

Information concerning such aspects as the course of the disease and its symptoms at the two salmon farms where it was observed was obtained by means of on-site surveys. With regard to the investigation of the etiology, anatomical examinations and tests such as blood tests, bacteriological tests, viral tests and parasite tests were carried out, but the methods did not differ greatly from the examination methods used in the case of known diseases observed in the country.

Results

1. Survey of Conditions of Occurrence

   (1) Area of occurrence: As of November 1978, this disease was observed at two salmon farms in the northwestern part of the prefecture among the 16 salmon farms in the prefecture.

   (2) Course of disease: At salmon farm A the incidence of the disease was 10% beginning in 1975. The incidence increased at a high rate every year, reaching 100% in 1978. At salmon farm B a pond was newly established in 1974, and in 1976 the incidence of the disease was 50%. In 1978 the incidence of the disease and death was 100%. At both salmon farms A and B the percentage infected has been increasing every year.

   (3) Period of occurrence and water temperature: At both salmon farms the disease begins to appear in late May and subsides in mid-June, and the water temperature during this period varies daily between 14° and 18°C.

   (4) Species and ages of fish in which the disease occurs: The species in which the disease is observed are yamame and amago. It is not observed in rainbow trout reared in the same water. The disease occurs in both fish in their first year and fish in their second year of life.

2. Examination Concerning Etiology

   (1) Summary of symptoms: Lying sideways at the bottom of the pond is the principal symptom. If the individual lying sideways is stimulated physically, it will swim vigorously for a short time, but will soon lie sideways again. Within two to five days after lying sideways, many diseased fish die.

(2) External findings: Apart from a slight hollowing caused by the rigidity of the lateral abdominal muscles, signs of the disease cannot be observed.

(3) Anatomical findings: Apart from local reddening of the medulla, no signs such as pathological change in the internal organs or intramuscular hemorrhaging are observed.

(4) Blood tests, bacteriological tests, viral tests: Each of the tests indicated that anemia, known bacterial diseases, IHN and IPN are not possible factors.

(5) Detection of myxosporidia: In the medulla of diseased fish at both salmon farms A and B and in the cranial nerves [of fish] at salmon farm B, myxosporidia spores were detected in large quantities. Myxosporidia spores, however, were observed in surviving fish as well.

Discussion and Problem Areas

By such means as surveys of the conditions of the occurrence of the disease and anatomical examinations of diseased fish, it was not possible to find any known disease or pathogen. Because, however, the myxosporidia spores parasitic in nervous tissue have been observed in large quantities in the medulla of diseased fish, they have been suspected of being the cause of this disease, but for such reasons as the fact that there have not been sufficient pathohistological examinations or observation of the trophozoites, and the fact that in some individuals the disease has not occurred even though spores have been detected, one cannot conclude that they are the cause. Because the parasitism is not observed in rainbow trout, and because the region

parasitized is the nervous tissue, the organisms are not believed to be the organisms that cause whirling disease.

(person in charge: Murakami)